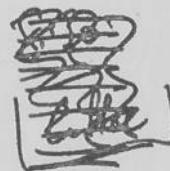


1. The Original Plans

(1)

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2. The Present Position

The Laboratory has now been in operation for about 1½ years. All three Divisions ~~have settled down & have started~~ days are now well set up, with substantial programmes of work

2. There has been considerable informal collaboration between the Divisions, and much in progress.

Facilitated by the centre. There has also been a fair amount of sharing of apparatus. Joint ^{research programme} work between the

Divisions has only recently started but may be expected to

develop further.

We note, with some regret, that no collaboration has yet sprung up between Prof. Mitchell's department and our own.

The Present Position

Since 1958 Molecular Biology has made great progress.

The major developments have been the solution of the structure of the DNA molecule. We can now ~~first~~ ^{ask} whether the space and facilities provided were adequate for this program and for the staff. As to facilities, it is fair to say that the ~~space and equipment~~ provided for the four senior ~~and~~ workers the space and equipment I was ~~want~~ very good. It has, however, proved inadequate in two respects:

① Insufficient space was allowed for Huxley and Kling to build up groups ~~in Governmental institutions~~ ^{of} ~~of~~ ~~the~~ ~~Governmental institutions~~.

Huxley and Kling have international reputations and on any assessment should have more space. The same would have been true of Tissieres if he had stayed with us.

(2) the space required for biochemistry was underestimated. ^{somewhat}

The second horizon

However Biochemistry has ~~not~~

There ~~research~~ The total extra space needed to cover the requirements is not very ~~too~~ great. Probably an extra 2,000 ft² would have been enough.

However since then the Molecular Biology has advanced

rapidly. ~~the structure~~ ~~the structure~~ ~~the X-ray~~

analysis of myoglobin and haemoglobin ~~has~~ made great

strides. ~~the genetics~~ The mechanism of protein synthesis and

the genetic code are now partly understood. It is

broadly true

~~one~~ to say that all the ~~the~~ classical problems of

in outline

Molecular Biology are either solved or well on the

way to solution. The time has come, therefore, to

make a reassessment of ~~that~~ ~~whole~~ ~~all~~ our work.

Inset over

Inset

It may seem surprising that there should be
necessary so soon after the laboratory has been
built, but this is because the rate of advance
of scientific research is ~~less~~ becoming almost as
fast as the rate of erecting buildings.

3. Immediate Developments

A. Structural Studies and Protein Synthesis

The major problem here is to relate structure to function, not only for the two oxygen carrier proteins for some enzymes as well. ~~but~~ we feel that ^{the main effort} ~~now~~

expended on the problem of enzyme structure should be balanced by studies on enzyme function^s. ~~This would~~

~~be developed in~~ under Hartley. In addition we

we also feel that our strength in x-ray analysis and

electron microscopy should be matched by an ability

to apply optical and other physical methods to the study

of biological macromolecules.

The studies on enzyme function could be more easily expanded and be directed by Hartley ~~also~~. Be ~~so~~ to be

For the physical ~~classical~~ chemistry, we should need to

recruit someone from outside. The total floor space needed for these purposes is about 8,000 ft.²

B. Molecular Genetics

The next major problem in this field is the genetics and biochemistry and question of control mechanisms. We feel that

in the first place this can ~~now~~ for tactical reasons, be
and this ^{work} has already been started
more easily & studied in micro-organisms. ~~processes~~ ^{However} &

~~processes~~ It is ^{nevertheless} very desirable to continue the present studies
and
on protein synthesis & the genetic code & to provide a
proper background to the attack on the control problem.

~~However~~ ~~there is~~ ~~the~~ ~~day~~ ~~we~~ ~~cannot~~ ~~imagine~~

It is obvious that the problem of control mechanism
higher organisms and to
will lead on to embryology. and while it is not easy

at this stage to see the most fruitful line of development.

In order to consider two points now should be made:

① it would be sensible to start exploratory work ^{now} on

3

one or two "model systems". ~~or~~ ^{for} ~~such~~ ^{as} ~~such~~ ^{as} ~~such~~

from small metazoa we have in mind & small
metazoa, on which we can apply the chosen to be
suitable for ~~both~~ ^{rapid} genetic and biochemical techniques, but
work on higher organisms is not excluded.

(2) This area ~~needs~~, of all those discussed here,
is likely to expand steadily as time goes on.

To develop this work we have the ideal person
in Brenner. It will be recalled how Brenner was

originally recruited to in order to build up the
genetic biochemical and genetical work. Of his
position in the present laboratory is indispensable,
not only because of his obvious ability and his detailed

(4)
(3)
7
200
14000

6

technical knowledge, but because he is ^{practically} the only senior worker in the laboratory with a ~~long~~ biological and medical background.

We estimate that for the first phase of this work ~~at least~~ about 2000 £'s would be required.

optimum £'s

Longer term Plan.

4. Longer Term Plan

In the long run it is inevitable that molecular
biology will move towards and become part of
all biology. It is our strong conviction that

the proper direction for our work is towards
more biological studies. together There are

entrepreneurs fortunate in having a Breeder the
task is doubtful if he could take on these
ideal person to direct this work, ~~for his assistance~~
~~see from senior~~
~~position~~.

A possible arrangement
~~we can see the Pappa most likely development~~

would be to find a new senior person to
look after
~~and~~ the biochemical part of the Molecular

(A)

We do not wish to spend our time
on this kind solving problem where although both
molecular and biological are of much biological
interest.

(B)

We shall then be in a position to
approach central ~~biological~~ biological problem
from our molecular view-point.

(it will be recalled that we originally had Tissier in mind for this rôle)
 Secretary & Division), and to ~~also~~ create a new

Division for Control of Radiation under Beesner.

~~It will be recalled that we might~~

however whenever it eventually proposed it will

exist space for Beesner's expansion, and it

would be sensible to ~~allow~~ start to

build this space now, even if we ^{is} not

fully equipped immediately. The area we have in

mind for this is 8,000 ft².

4,000

8,000

5 Optimum size of laboratory together.

It has been said - - -

We should permit one that is quite easy to find
 such a concentration of senior workers who get along so
 well together than they wish to stay together!

1 + 2

The position of Mr. Leslie Orgel is a rather special one and has to be considered apart from the development of the laboratory.

In the first place it should be realised that in many ways ~~Dr~~ Orgel is has been for many years ~~for many years~~ ~~in fact~~ ~~a member of our ~~team~~ laboratory~~ in fact a very closely associated with us ever since he came to Cambridge in 1956. ~~he discussed most of our work with him, especially~~ He has ~~not only~~ ~~been~~ followed all our work in considerable detail, ~~but he has been~~ ~~concerned~~ in the process of two ~~theoretical~~ papers and I have acquired to a wide and deep knowledge of molecular biology. ~~He is the co-author~~ He has written either

alone or in collaboration with us) ~~and~~ several theoretical
~~molecular biology~~

papers, and is at present engaged on a critical review
 It is universally recognized that he
 on the difficult subject of mutagenesis. He has one of

the keenest intellects in ~~the~~ molecular biology. ~~combined~~

~~with~~ Moreover his judgment is good and his inspiration is
~~feebble~~ fertile. If he wished to ~~become a member~~
 (for which he would need very little space)

join ~~us~~ as a Theoretician / we should ~~reject~~ his
 give ~~to~~ the proposal our whole-hearted support.

However he has made it completely clear that he
 wishes to ~~be able to~~ do direct experimental work. It
 has been suggested that he takes over the direction of the
 physical chemistry

in the laboratory. Reluctantly we have come to the

conclusion that this is not a good idea, since we feel
 that although he wishes to do ~~a certain amount of~~
 experiments on some aspects of the physical chemistry of biological

3

macromolecules

& ~~that~~ his real interest lie elsewhere.

There ~~does~~ seems little doubt that the problem that ~~mainly~~
~~other~~ attracts him ~~other~~ above all others is that of
the ~~direct~~ origin of life, and in particular the relatively
simple chemical reactions which are
presumed to have ~~not~~ prepared ~~the~~ ~~first~~ built up the
concentration of ~~size~~ ^{small} organic molecules needed before
life could begin. He has thought about ^{these} problems
for several years, and has ~~had~~ and a novel
idea as to what experiments should be done. His
~~wide~~ wide knowledge of molecular biology, combined with
his & easy form of theoretical chemistry make him the
ideal person for this work. It would be difficult to

match these qualifications ~~is any~~ ^{anywhere} greater in the world, and impossible in Great Britain. We have no doubt that such work, directed by him, would lead to very interesting results.

This problem - the origin of life - is now in the same state as the other ~~rest~~ lines of work in the laboratory. Rutherford recalls the state of the molecular biology at the time the Council first set up our Unit.

Many interesting things can be tried, but ~~the~~ definitive answer ^{to the main question} are not likely to be obtained for some ~~time~~.

~~will be~~

time. ~~Be~~ ^{they} moreover the results ~~will~~ ^{will} be mainly

of "pure" scientific interest, although we are confident

that ~~the~~ ^{they} ~~so far~~ work will ^{also} illuminate molecular biology,

and thus, indirectly, ~~the~~ medicine itself. The Pe

To support such work is therefore sometimes of a
gamble. We feel strongly, however, that this is a the
sort of gamble which the Council (and other similar
organisation) must take from time to time. ~~is wise~~
at least in a few well-chosen cases, if the ~~rest~~
virtosity of the ~~organization~~ biological service is to be
~~preserved~~. Moreover it is quite ~~desir~~
~~desir~~ it does not receive support. he will
go to the State, ~~and~~ know where he will have no
difficulty or all in getting all the facilities he wants. The con-
tribution to British Molecular Biology would be very great. He is,
after all, the youngest F.R.S. in the subject.

Although we cannot make a case that ~~Orgel's work~~
~~is closely~~ this project of orgels is (very closely) linked
to our other work, & we are naturally interested in it.
~~and we would welcome Orgel as a colleague~~ It is
clear how his work should be supported somewhere in
England. We would like him as a colleague and he
obviously
would like to work alongside us. ~~Mostly~~ the sensible
plan would be to provide space for him ~~as~~ &
as part of the extension of our laboratory. Failing that
we hope that a unit ^{will} be created for him ~~as~~
elsewhere in
Cambridge, so that we should remain in
close touch with him. The space he would require is
estimated at
sq ft.